IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

TAE-SUNG KIM

Serial No.:	10/767,281	Examiner:	*to be assigned*
Filed:	30 January 2004	Art Unit:	2811

For: NOVEL CONDUCTIVE ELEMENTS FOR THIN FILM TRANSISTORS USED IN A FLAT PANEL DISPLAY

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O.Box 1450
Alexandria, VA 22313-1450

Sir:

In accordance with 37 C.F.R. §1.56, and §§1.97 and 1.98 as amended, Applicant cites and describes the following art references. In accordance with the new regulation set forth in the *Official Gazette Notices: 05 August 2003* (a copy attached herewith), a copy of the U.S. patent references cited below is not attached.

1. U.S. Patent No. 6,255,706 to Watanabe *et al.*, entitled *THIN FILM TRANSISTOR AND METHOD OF MANUFACTURING SAME*, issued on July 3, 2001;

2. U.S. Patent No. 6,448,612 to Miyazaki *et al.*, entitled *PIXEL THIN FILM TRANSISTOR AND A DRIVER CIRCUIT FOR DRIVING THE PIXEL THIN FILM TRANSISTOR*, issued on September 10, 2002;

3. U.S. Patent No. 6,440,752 to Zhang *et al.*, entitled *ELECTRODE MATERIALS WITH IMPROVED HYDROGEN DEGRADATION RESISTANCE AND*

FABRICATION METHOD, issued on August 27, 2002;

4. U.S. Patent No. 6,348,735 to Yamaoka *et al.*, entitled *ELECTRODE FOR SEMICONDUCTOR DEVICE AND METHOD FOR MANUFACTURING SAME*, issued on February 19, 2002;

5. U.S. Patent No. 6,147,375 to Yamazaki *et al.*, entitled *ACTIVE MATRIX DISPLAY DEVICE*, issued on November 14, 2000;

6. U.S. Patent No. 5,555,112 to Oritsuki *et al.*, entitled *LIQUID CRYSTAL DISPLAY DEVICE HAVING MULTILAYER GATE BUSLINE COMPOSED OF METAL OXIDE AND SEMICONDUCTOR*, issued on September 10, 1996;

7. U.S. Patent No. 5,485,019 to Yamazaki *et al.*, entitled *SEMICONDUCTOR DEVICE AND METHOD FOR FORMING THE SAME*, issued on January 16, 1996;

8. U.S. Patent No. 5,345,108 to Kikkawa, entitled *SEMICONDUCTOR DEVICE HAVING MULTI-LAYER ELECTRODE WIRING*, issued on September 6, 1994;

9. U.S. Patent No. 5,243,202 to Mori *et al.*, entitled *THIN-FILM TRANSISTOR AND A LIQUID CRYSTAL MATRIX DISPLAY DEVICE USING THIN-FILM TRANSISTORS OF THIS TYPE*, issued on September 7, 1993; and

10. U.S. Patent No. 4,153,529 to Little *et al.*, entitled *MEANS AND METHOD FOR INDUCING UNIFORM PARALLEL ALIGNMENT OF LIQUID CRYSTAL MATERIAL IN A LIQUID CRYSTAL CELL*, issued on May 8, 1979.

11. PCT Publication No. WO 99/08322 to Laska *et al.*, entitled *SEMICONDUCTOR WITH METAL COATING ON ITS REAR SURFACES*, published on 18 February 1999 (corresponding to U.S. Patent No. 6,147,403 issued on November 14, 2000;

12. Japanese Patent Publication No. 09-153623 to Urazono, entitled *THIN FILM SEMICONDUCTOR*, published on June 10, 1997;

13. Japanese Patent Publication No. 09-45927 to Yamazaki, entitled *SEMICONDUCTOR DEVICE*, published on February 14, 1997 (corresponding to U.S. Patent No. 6,166,396 issued on December 26 2000);

14. Japanese Patent Publication No. 04-265757 to Kawasaki, entitled *THIN FILM TYPE THERMAL HEAD*, published on September 21, 1992;

15. Japanese Patent Publication No. 64-19763 to Shankar *et al.*, entitled *IMPROVED INTEGRATED CIRCUIT STRUCTURE AND ITS FORMATION*, published on January 23, 1989 (corresponding to U.S. Patent No. 4,782,380 isseud on November 1, 1988);

16. Japanese Patent Publication No. 59-232464 to Morimitsu *et al.*, entitled *COMPOUND SEMICONDUCTOR DEVICE*, published on December 27, 1984;

17. Japanese Patent Publication No. 62-221159 to Yanai *et al.*, entitled *FORMATION OF THIN FILM TRANSISTOR MATRIX*, published on September 29, 1987;

18. Japanese Patent Publication No. 62-120076 to Nasu *et al.*, entitled *THIN FILM TRANSISTOR*, published on June 1, 1987;

19. Japanese Patent Publication No. 2000-149766 to Yamada *et al.*, entitled *ELECTRON EMISSION ELEMENT AND DISPLAY DEVICE BY USING IT*, published on May 30, 2000 (corresponding to U.S. Patent No. 6,285,123 issued on Setpember 4, 2001);

20. Japanese Patent Publication No. 11-144709 to Furubayashi *et al.*, entitled *ELECTRODE FOR ELECTROCHEMICAL ELEMENT*, published on May 28, 1999;

21. Japanese Patent Publication No. 08-129292 to Arima *et al.*, entitled *CHARGE GENERATION CONTROL ELEMENT FOR ELECTROSTATIC IMAGE FORMING DEVICE AND ITS PRODUCTION*, published on May 21, 1996 (corresponding to U.S. Patent No. 5,742,468 issued on April 21, 1998); and

22. Japanese Patent Publication No. 64-36083 to Arita, entitled *AMORPHOUS SILICON SOLAR CELL*, published on February 7, 1989.

Watanabe *et al.* '706 relates to a thin film transistor having an improved wiring line structure, to a thin film transistor broadly used for a liquid crystal display unit, and to a method of manufacturing the same.

Miyazaki *et al.* '612 discloses "an electronic circuit formed on an insulating substrate and having thin-film transistors (TFTs) comprising semiconductor layers." The thickness of the semiconductor layers is less than 1500 ANG., *e.g.*, between 100 and 750 ANG. A first layer consisting mainly of titanium and nitrogen is formed on the semiconductor layer. A second layer consisting aluminum is formed on top of the first layer.

Zhang *et al.* '752 discloses that "an electrode for use in a ferroelectric device includes

a bottom electrode; a ferroelectric layer; and a top electrode formed on the ferroelectric layer and formed of a combination of metals, including a first metal taken from the group of metals consisting of platinum and iridium, and a second metal taken from the group of metals consisting of aluminum and titanium; wherein the top electrode acts as a passivation layer and wherein the top electrode remains conductive following high temperature annealing in a hydrogen atmosphere."

Yamaoka *et al.* '735 discloses that "an interlayer insulator film 11, a titanium layer 12, a titanium nitride layer 13 that serves as the barrier layer, an aluminum alloy wiring layer 15 and a protective film 18 are formed on top of the silicon substrate 10 to compose the electrode structure."

Yamazaki *et al.* '375 discloses in claim 2 that, "an active matrix display device according to claim 1 wherein at least one of said wiring and said gate electrode comprises a material selected from the group consisting of silicon, aluminum tantalum, titanium, tungsten, molybdenum, an alloy thereof, tantalum nitride, titanium nitride, tungsten nitride and molybdenum nitride."

Oritsuki *et al.* '112 discloses in claim 3 that, "a liquid crystal display substrate according to claim 1, wherein the gate electrode is made of at least one layer made of a material selected from the group consisting of aluminum tantalum and titanium and their alloys."

Yamazaki *et al.* '019 discloses in claim 2 that, "the device of claim 1 wherein said first wiring comprises a material selected from the group consisting of silicon, aluminum, tantalum, titanium, tungsten, molybdenum, an alloy thereof, tantalum nitride, titanium nitride, tungsten silicide, and molybdenum silicide."

Kikkawa '108 discloses"a semiconductor device having an electrode wiring which

prevents generation of hillock and has good stress migration capability." A multilayer film includes at least two Al-SI-Cu alloy films and at least two titanium nitride films.

Mori *et al.* '202 discloses "a thin-film transistor comprises a gate electrode formed on a glass substrate ... the gate electrode is made of titanium-containing aluminum."

Little *et al.* '529 discloses that "electrode surfaces are coated with a passivating material (silicon dioxide, aluminum oxide or titanium dioxide)."

Laska '322 aims at considerably reducing the warpage of semiconductor wafer edges without affecting adherence on the substrate material. English language Abstract is attached.

Urazono '623 aims at enabling prevention of voids and hillocks and hence prevention of disconnection without increasing wiring resistance, by providing a multilayer structure of wiring in which an aluminum metal film and a refractory metal film are stacked. English language Abstract is attached.

Yamazaki '927 aims at eliminating contact failures and solve the reliability problems for an active matrix liquid crystal display. English language Abstract is attached.

Kawasaki '757 relates to a thin film type thermal head having high reliability by preventing breaking of wire caused by energizing a power feed layer. English language Abstract is attached.

Shankar *et al.* '763 aims at reducing the diffusion of aluminum and silicon between a substrate and a second metallic layer by forming a novel multilayered conductive interconnection layer between the substrate and metallic layer and, at the same time, reducing the formation of spikes or hillocks in an aluminum connection layer. English language

Abstract is attached.

Morimitsu *et al.* '464 aims at preventing the variation of pinch-off voltage caused by an usual heat treatment in manufacturing process by forming a gate electrode out of two layers in which high-melting-point metal is used for the first layer of the substrate side and aluminum is used for the second layer. English language Abstract is attached.

Yanai '159 aims at reducing the short-circuit defects of a transistor and obtaining a highly reliable thin film transistor matrix by a method wherein, before formation of a gate insulating film and an operating semiconductor layer, the substrate provided with a gate and a gate bus line, is flattened. English language Abstract is attached.

Nasu '076 aims at decreasing an OFF current, increasing ration of the width to the length of a channel, microminiaturizing it and increasing an allowable current, by increasing the length (channel length) of electron running direction at the end of the channel larger than the center part. English language Abstract is attached.

Yamada *et al.* '766 aims at emitting electrons stably with a low voltage by forming an insulator layer on an electron supply layer comprising a metal or a metal compound or a semiconductor, and by forming a metal thin film electrode on the insulator layer, and by making the insulator layer and the metal thin film electrode having at least one island region where the film thickness is reduced gradually. English language Abstract is attached.

Furubayashi *et al.* '709 relates to an electrode for electrochemical element and its manufacturing method that can efficiently conduct electrons to an inner electroconductive assistant, that can attain a contact with a current collecting part surer and stronger, and that can reduce internal resistance. English language Abstract is attached.

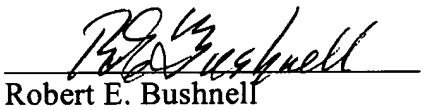
Arima *et al.* '292 relates to a charge generation control element for electrostatic image forming device with which a drastic reduction of line electrode size and an improvement in dimensional accuracy are made possible and a process for production thereof. English language Abstract is attached.

Arita '083 aims at improving the characteristics of an amorphous silicon solar cell by setting the thickness of a titanium or chrome film in a specific range, thereby effectively utilizing a long-wavelength light. English language Abstract is attached.

The citation of the foregoing references is not intended to constitute an assertion that other or more relevant art does not exist. Accordingly, the Examiner is requested to make a wide-ranging and thorough search of the relevant art.

No fee is incurred by this Statement.

Respectfully submitted,



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INFORMATION DISCLOSURE STATEMENT
PTO-1449 (PAGE 1 OF 2)

SERIAL NUMBER	10/767281	DOCKET NO.	P57002
APPLICANT	TAE-SUNG KIM		
FILING DATE	30 January 2004	GROUP	2811

U.S. PATENT DOCUMENTS

EXAMINER INITIALS	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE
	6,255,706	7/01	Watanabe et al.			
	6,448,612	9/02	Miyazaki et al.			
	6,440,752	8/02	Zhang et al.			
	6,348,735	2/02	Yamaoka et al.			
	6,147,375	11/00	Yamazaki et al.			
	5,555,112	9/96	Oritsuki et al.			
	5,485,019	1/96	Yamazaki et al.			
	5,345,108	9/94	Kikkawa			
	5,243,202	9/93	Mori et al.			
	4,153,529	5/79	Little et al.			

FOREIGN PATENT DOCUMENTS

						TRANSLATION	
	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	YES	NO
	WO 99/08322	2/99	PCT			Abstract	
	JP09-153623	6/97	Japan			Abstract	
	JP09-45927	2/97	Japan			Abstract	
	JP04-265757	9/92	Japan			Abstract	
	JP64-19763	1/89	Japan			Abstract	
	JP59-232464	12/84	Japan			Abstract	

OTHER DOCUMENTS ***(Including Author, Title, Date, Pertinent Pages, etc.)***

EXAMINER: *DATE CONSIDERED:*

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP §609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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	6,147,403	11/00	Matschitsch et al.			
	6,166,396	12/00	Yamazaki			
	4,782,380	11/88	Shankar et al.			
	6,285,123	9/01	Yamada et al.			
	5,742,468	4/98	Matsumoto et al.			

FOREIGN PATENT DOCUMENTS

	DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES	TRANSLATION NO
	JP62-221159	9/87	Japan			Abstra	
	JP62-120076	6/87	Japan			Abstra	
	JP2000-149766	5/00	Japan			Abstra	
	JP11-144709	5/99	Japan			Abstra	
	JP08-129292	5/96	Japan			Abstra	
	JP64-36083	2/89	Japan			Abstra	

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